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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/730,813	12/06/2000	Toshihiro Tabuchi	0112780-017	9116

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EXAMINER
HASSANZADEH, PARVIZ

ART UNIT	PAPER NUMBER
1763	

DATE MAILED: 01/27/2003

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Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/730,813	TABUCHI ET AL.	
	Examiner	Art Unit	
	Parviz Hassanzadeh	1763	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *02 January 2003* .

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-19* is/are pending in the application.

4a) Of the above claim(s) *2,3 and 13-18* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1,4-12 and 19* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *06 December 2000* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11)☐ The proposed drawing correction filed on _____ is: a)☐ approved b)☐ disapproved by the Examiner.

If approved, corrected drawings are required in reply to this Office action.

12)☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

13)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____ .

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).

a) ☐ The translation of the foreign language provisional application has been received.

15)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ .
4) ☐ Interview Summary (PTO-413) Paper No(s). _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: .

DETAILED ACTION

Election/Restrictions

Applicant's election without traverse of Species 8 (at least one of the plasma nozzles is made a hollow discharge generation area), claims 1, 4-12 and 19 in Paper No. 7 is acknowledged. It is noted that claim 18 (including a magnetic filed formed in the vicinity of the plasma nozzle and/or in the vicinity of the recess, through hole, and/or in the hollow inside) belongs to non-elected species 9.

Claims 2, 3, 13-18 withdrawn from further consideration pursuant to 37 CFR 1.142(b) as being drawn to a nonelected Species 1-7, 9-17, there being no allowable generic or linking claim. Election was made **without** traverse in Paper No. 7.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (a) the invention was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before the invention thereof by the applicant for a patent.
>
> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

Claim 1 is rejected under 35 U.S.C. 102(a) as being anticipated by Tabuchi et al (JP 2000-273645-A).

Tabuchi et al teach a surface treatment apparatus (Fig. 1) for making raw material gas plasma by generating plasma, in a casing 2 provided with plasma generation electrode 5 and 6 (*plasma generation means*), a gas introducing port 5b (*raw material gas inlet*) and a substrate support table 8, by the plasma generation electrodes 5 and 6 (*plasma generation means*) and giving plasma treatment to the surface of a substrate S placed on the substrate support table 8, wherein:

the casing 2 is defined into two chambers 3 and 4, a plasma generation chamber 3 provided with the plasma generation electrodes 5, 6 (*plasma generation means*) and a substrate treatment chamber 4 provided with the substrate support table 8;

the substrate treatment chamber 4 and the plasma generation chamber 3 are connected through a plasma blow-off port 7 (*one or more plasma nozzles*); and

wherein as shown in Fig. 8, the plasma blow-off port 7 form a hollow electrode (ground or anode electrode) where luminescence intensity becomes strong locally in the plasma outlet 7 (*at least one of the plasma nozzles is made a hollow electrode discharge generation area*) (abstract and paragraphs 0021-0023, 0031-0032).

Claims 1 and 4 are rejected under 35 U.S.C. 102(e) as being anticipated by Takahashi et al (US Patent No. 6,192,828 B1).

Takahashi et al teach a surface treatment apparatus (Fig. 1) for making raw material gas plasma by generating plasma, in a casing provided with a high frequency electrode 12 (*plasma generation electrode*) and a perforated electrode 30 (*plasma generation means*), a gas introducing pipe 26 (*raw material gas inlet*) and a base material holder 8 (*substrate support table*), by the plasma generation electrodes 12 and 30 (*plasma generation means*) and giving

plasma treatment to the surface of a base material 10 (*substrate*) placed on the substrate support table 8, wherein:

the casing is defined into two chambers 24 and 22, a plasma container chamber 24 (plasma generation chamber) provided with the plasma generation electrodes 12, 30 (*plasma generation means*) and a film formation chamber 22 (*substrate treatment chamber*) provided with the substrate support table 8;

the substrate treatment chamber 22 and the plasma generation chamber 24 are connected through a perforated electrode 30 (*one or more plasma nozzles*) which coupled to a pulse power source 36; and

wherein the diameter of the pores are preferably in the range of 0.1-10 mm (*at least one of the plasma nozzles is made a hollow electrode discharge generation area; W(1)≤ 5L corresponding to W=1-100 mm based on page 35*) (column 4, line 19 through column 5, line 58).

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out

the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

Claims 4-12 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tabuchi et al (JP 2000-273645-A).

Tabuchi et al teach all limitations of the claims as discussed above except for explicit disclosure of the dimension and shape of the plasma nozzle.

Regarding change in size: the plasma outlet 7 of Tabuchi et al has necessary nozzle dimensions , that is, outlet configurations which can draw plasma from a plasma generating room positively, and can diffuse at an angle of a request (paragraph 0017).

It was held in re Gardner v. TEC Systems, Inc., 725 F.2d 1338, 220 USPQ 777 (Fed. Cir. 1984), cert. denied, 469 U.S. 830, 225 USPQ 232 (1984) that where the only difference between the prior art and the claims was a recitation of relative dimensions of the claimed device and a device having the claimed relative dimensions would not perform differently than the prior art device, the claimed device was not patentably distinct from the prior art device.

Regarding change in shape: the plasma outlet 7 of Tabuchi et al may be cylindrical shape with a circular cross section, a cone whose diameter is expanded towards a substrate processing chamber, or a slit configuration (paragraph 0017).

It was held in *re Dailey, 357 F.2d 669, 149 USPQ 47 (CCPA 1966)* that the shape was a matter of choice which a person of ordinary skill in the art would have found obvious absent persuasive evidence that the particular shape was significant. (Also see MPEP 2144.04(d)).

Therefore, it would have been obvious to one with ordinary skill in the art at the time the invention was made to select the desire size and shape of the plasma nozzle in order to guide plasma species into the processing chamber along a desired direction (perpendicular to the surface of the substrate) as well as distribute the plasma species uniformly over the substrate.

Claim 19 is rejected under 35 U.S.C. 103(a) as being unpatentable over Tabuchi et al (JP 2000-273645-A) in view of Hartig et al (US Patent No. 5,683,548).

Tabuchi et al teach all limitations of the claim as discussed above except for potential applying means (*bias applying power source*) for applying a desired potential to the substrate.

Hartig et al teach a plasma processing apparatus (Fig. 1) including an RF bias power supply 32 coupled to a chuck 14 for further controlling the bombardment energy of ionized species within plasma 30 upon semiconductor wafer 28.

Therefore it would have been obvious to one of ordinary skill in the art at the time of the invention to employ the bias power supply as taught by Hartig et al in the apparatus of Tabuchi et al in order to further control the energies of plasma species impinging upon the substrate.

Claims 5-12 are rejected under 35 U.S.C. 103(a) as being unpatentable over Takahashi et al (US Patent No. 6,192,828 B1).

Tabuchi et al teach all limitations of the claims as discussed above except for the shape of the plasma nozzles.

Regarding change in shape: It was held in *re Dailey, 357 F.2d 669, 149 USPQ 47 (CCPA 1966)* that the shape was a matter of choice which a person of ordinary skill in the art

would have found obvious absent persuasive evidence that the particular shape was significant. (Also see MPEP 2144.04(d)).

Therefore, it would have been obvious to one with ordinary skill in the art at the time the invention was made to select the desire shape of the plasma nozzle in order to distribute the plasma species uniformly over the substrate.

Claim 19 is rejected under 35 U.S.C. 103(a) as being unpatentable over Takahashi et al (US Patent No. 6,192,828 B1) in view of Hartig et al (US Patent No. 5,683,548).

Tabuchi et al teach all limitations of the claim as discussed above except for potential applying means (*bias applying power source*) for applying a desired potential to the substrate.

Hartig et al teach a plasma processing apparatus (Fig. 1) including an RF bias power supply 32 coupled to a chuck 14 for further controlling the bombardment energy of ionized species within plasma 30 upon semiconductor wafer 28.

Therefore it would have been obvious to one of ordinary skill in the art at the time of the invention to employ the bias power supply as taught by Hartig et al in the apparatus of Takahashi et al in order to further control the energies of plasma species impinging upon the substrate.

Response to Arguments

Applicant's arguments filed 1/2/03 have been fully considered but they are not persuasive.

The Applicants assert that Tabuchi et al does teach a plasma discharge with a hallow structure of electrode at the nozzle as cited in claim 1 as "*at least one of said plasma nozzles is made a hollow electrode discharge generation area*".

The Examiner argues that Fig. 8 of Tabuchi et al teach a plasma blow-off port 7 forming a hollow electrode (ground or anode electrode) where luminescence intensity becomes strong locally in the plasma outlet 7 (abstract and paragraphs 0021-0023, 0031-0032).

The Applicants assert that Takahashi et al does teach a plasma discharge with a hallow structure of electrode at the nozzle as cited in claim 1 as "*at least one of said plasma nozzles is made a hollow electrode discharge generation area*".

The Examiner argues that Takahashi et al teach a perforated electrode 30 (*one or more plasma nozzles*) which coupled to a pulse power source 36 (column 4, line 19 through column 5, line 58).

The Applicants assert that Hartig et al uses inductively coupled plasma source and does not teach a hollow electrode discharge as recited in the newly amended claim 1.

The Examiner hereby withdraw the anticipation rejection of claim 1 by Hartig et al.

The Applicants assert that Tabuchi et al does not teach hollow electrode discharge because the plasma appearance is different from the present claimed invention.

The Examiner argues that the appearance and shape of plasma depends on operational parameters (process limitations) such as applied power, gas pressure which also affect the speed of deposition.

The Applicants assert that Tabuchi et al in view of Hartig et al do not teach a hollow electrode discharge as discussed above.

The Examiner presents that Tabuchi et al as discussed above teach the hollow electrode discharge as recited in the claim and further the Examiner clarifies that Hartig et al is used only for teaching an RF bias power supply (*a potential applying means*).

The Applicants assert that Takahashi et al doe not teach a hollow electrode discharge by which films with high crystallinity can be form at a high speed, wherein the appearance of hollow discharge depends process conditions such as gas pressure and impressed voltage.

The Examiner argues that the Takahashi et al as discussed above teach all the structural limitations of the apparatus as claimed and the appearance of the plasma depend on the operational parameters (process limitations).

The Applicants assert that Takahashi et al in view of Hartig et al do not teach a hollow electrode discharge as discussed above.

The Examiner presents that Takahashi et al as discussed above teach the hollow electrode discharge as recited in the claim and further the Examiner clarifies that Hartig et al is used only for teaching an RF bias power supply (*a potential applying means*).

Conclusion

THIS ACTION IS MADE FINAL. Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period

will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Morita (US Patent No. 5,543,688) teach a plasma reactor including interleaved electrodes for generating a plasma sufficiently removed from a substrate;

Akahori (US Patent No. 5,508,066) teach a plasma reactor including a plasma generation chamber coupled to a plasma processing chamber via an opening 12 formed in the center of a diaphragm 11;

Matsuoka et al (US Patent No. 4,911,814) teach a plasma generating chamber opening into a plasma processing chamber;

Kishida et al (US Patent No. 6,051,120) teach a plasma generating chamber providing ion to a processing chamber via drawing electrodes 5a-5c;

Urano (JP 7-37870-A) teach a sealed multiple-hole electrode 4 provided between a plasma generation chamber 2 and a process chamber 1;

Yuda (JP 11-168094-A) teach intermediate mesh plate electrode 11 disposed between a plasma generation region and a substrate processing region;

Geisler et al (US Patent No. 5,399,254) teach a hollow electrode 3 including inner surface 11 having projections 12 to enlarge the inner surface area of the electrode.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Parviz Hassanzadeh whose telephone number is (703)308-2050. The examiner can normally be reached on Tuesday-Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Gregory L. Mills can be reached on (703)308-1633. The fax phone numbers for the organization where this application or proceeding is assigned are (703)872-9310 for regular communications and (703)872-9311 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703)308-0661.

P. Hassanzadeh

Parviz Hassanzadeh
Examiner
Art Unit 1763

January 25, 2003